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TURNER AND MULREADY :

THE EFFECT OF CERTAIN FAULTS OF VISION ON PAINTING,
WITH ESPECIAL REFERENCE TO THEIR WORKS :

THE REAL AND IDEAL IN PORTRAITURE :

THE DETERIORATION OF OIL PAINTINGS.

THREE LECTURES

BY

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I HAVE been frequently asked to have these lectures reprinted, in order to render them more easily accessible. I publish them together, notwithstanding the difference of the subjects, as all three originated from researches following the same line. This line, which is also characteristic of the investigations I still pursue of the technique of the Old Masters, may be designated as "treatment of questions of art from a scientific point of view."

I have made no alterations, nor have I added any notes, in spite of the strong temptation to seize this opportunity for the refutation of some criticisms directed especially against the first lecture. I think the publication of the full text will be the best answer to most of these criticisms, which, as I feel convinced, have been based only on incomplete reports of what I had said.

In the second lecture, some observations which were correct at the time are now no longer applicable—for instance, the remarks directed against the method of exhibiting works of sculpture in the Royal Academy, in which great improvement has since been effected.

Since the delivery of the third lecture my researches on that question have been continued. I prefer, however, to have the lecture reprinted in its original state, and to reserve the results of my further researches for an extensive work on a similar subject.

I shall be happy if artists or amateurs find in this pamphlet any observations which may prove of use to them.

R. LIEBREICH.

LONDON,
August, 1888.

Royal Institution of Great Britain.

WEEKLY EVENING MEETING,

Friday, March 8, 1872.

WILLIAM SPOTTISWOODE, Esq., M.A., LL.D., Treas. R.S. and R.I.,
in the Chair.

R. LIEBREICH, Esq. M.R.I.,

OPHTHALMIC SURGEON AND LECTURER AT ST. THOMAS'S HOSPITAL.

*Turner and Mulready—On the Effect of certain Faults of Vision on
Painting, with especial Reference to their Works.*

WHEN I arrived in England about eighteen months ago, little thinking that a short vacation tour would end in my permanent residence here, I at once paid a visit to the National Gallery. I was anxious to see Turner's pictures, which on the Continent I had had no opportunity of doing. How great was my astonishment when, after having admired his earlier works, I entered another room which contained his later paintings! Are these really by the same hand? I asked myself on first inspecting them; or have they suffered in any way? On examining them, however, more closely, a question presented itself to my mind which was to me a subject of interesting diagnosis. Was the great change which made the painter of "Crossing the Brook" afterwards produce such pictures as "Shade and Darkness," caused by an ocular or cerebral disturbance? Researches into the life of Turner could not afford an answer to this question. All that I could learn was, that during the last five years of his life his power of vision as well as his intellect had suffered. In no way, however, did this account for the changes which began to manifest themselves about fifteen years before that time. The question could therefore only be answered by a direct study of his pictures from a purely scientific, and not at all from an æsthetic or artistic point of view.

I chose for this purpose pictures belonging to the middle of the period, which I consider pathological, *i.e.*, not quite healthy, and analyzed them in all their details, with regard to colour, drawing, and distribution of light and shade.

It was particularly important to ascertain if the anomaly of the whole picture could be deduced from a regularly recurring fault in its details. This fault is a vertical streakiness, which is caused by every illuminated point having been changed into a vertical line. The elongation is, generally speaking, in exact proportion to the brightness

of the light; that is to say, the more intense the light which diffuses itself from the illuminated point in nature, the longer becomes the line which represents it on the picture. Thus, for instance, there proceeds from the sun in the centre of a picture a vertical yellow streak, dividing it into two entirely distinct halves, which are not connected by any horizontal line. In Turner's earlier pictures, the disk of the sun is clearly defined, the light equally radiating to all parts; and even where through the reflection of water a vertical streak is produced, there appears, distinctly marked through the vertical streak of light, the line of the horizon, the demarcation of the land in the foreground, and the outline of the waves in a horizontal direction. In the pictures, however, of which I am now speaking, the tracing of any detail is perfectly effaced when it falls in the vertical streak of light. Even less illuminated objects, like houses or figures, form considerably elongated streaks of light. In this manner, therefore, houses that stand near the water, or people in a boat, blend so entirely with the reflection in the water that the horizontal line of demarcation between house and water or boat and water entirely disappears, and all becomes a conglomeration of vertical lines. Everything that is abnormal in the shape of objects, in the drawing, and even in the colouring of the pictures of this period, can be explained by this vertical diffusion of light.

How and at what time did this anomaly develop itself?

Till the year 1830 all is normal. In 1831 a change in the colouring becomes for the first time perceptible, which gives to the works of Turner a peculiar character not found in any other master. Optically this is caused by an increased intensity of the diffused light proceeding from the most illuminated parts of the landscape. This light forms a haze of a bluish colour which contrasts too much with the surrounding portion in shadow. From the year 1833 this diffusion of light becomes more and more vertical. It gradually increases during the following years. At first it can only be perceived by a careful examination of the picture, but from the year 1839 the regular vertical streaks become apparent to everyone. This increases subsequently to such a degree that when the pictures are closely examined they appear as if they had been wilfully destroyed by vertical strokes of the brush before they were dry, and it is only from a considerable distance that the object and the meaning of the picture can be comprehended. During the last years of Turner's life this peculiarity became so extreme that his pictures can hardly be understood at all.

It is a generally-received opinion that Turner adopted a peculiar manner, that he exaggerated it more and more, and that his last works are the result of a deranged intellect. I am convinced of the incorrectness, I might almost say of the injustice, of this opinion. The word "manner" has a very vague meaning. In general we understand by it something which has been arbitrarily assumed by the artist. It may be the result of study, of reflection, of a development of principle, or the consequence of a chance observation, of an experi-

ment, or of an occasional success. Nothing of all this applies to what has been called Turner's manner. Nothing in him is arbitrary, assumed, or of set purpose. According to my opinion, his manner is exclusively the result of a change in his *eyes*, which developed itself during the last twenty years of his life. In consequence of it the aspect of nature gradually changed for him, while he continued in an unconscious, I might almost say in a *naïve* manner, to reproduce what he saw. And he reproduced it so faithfully and accurately, that he enables us distinctly to recognize the nature of the disease of his eyes, to follow its development step by step, and to prove by an optical contrivance the correctness of our diagnosis. By the aid of this contrivance we can see nature under the same aspect as he saw and represented it. With the same we can also, as I shall prove to you by an experiment, give to Turner's early pictures the appearance of those of the later period.

After he had reached the age of fifty-five, the crystalline lenses of Turner's eyes became rather dim, and dispersed the light more strongly, and in consequence threw a bluish mist over illuminated objects. This is a pathological increase of an optical effect, the existence of which, even in the normal eye, can be proved by the following experiment. If you look at a picture which hangs between two windows, you will not be able to see it distinctly, as it will be, so to speak, veiled by a greyish haze. But if you hold your hands before your eyes so as to shade them from the light of the windows, the veiling mist disappears, and the picture becomes clearly visible. The disturbing light had been diffused by the refracting media of the eye, and had fallen on the same part of the retina on which the picture was formed. If we examine the eye by an illumination resembling that by means of which Professor Tyndall, in his brilliant experiments, demonstrated to you the imperfect transparency of water, we find that even the clearest and most beautiful eye is not so perfectly transparent as we would suppose. The older we get the more the transparency decreases, especially of the lens. But to produce an effect equal to that visible in Turner's pictures after the year 1831, pathological conditions are required. In the years that followed, as often happens in such cases, a clearly-defined opacity was formed in the slight and diffuse dimness of the crystalline lens. In consequence of this the light was no longer evenly diffused in all directions, but principally dispersed in a vertical direction. At this period the alteration offers, in the case of a painter, the peculiarity that it only affects the appearance of natural objects, where the light is strong enough to produce this disturbing effect, whilst the light of his painting is too feeble to do so: therefore, the aspect of nature is altered, that of his picture correct. Only within the last years of Turner's life, the dimness had increased so much, that it prevented him from seeing even his pictures correctly. This sufficiently accounts for the strange appearance of his last pictures, without its being necessary to take into account the state of his mind.

It may seem hazardous to designate a period as diseased, the beginning of which art-critics and connoisseurs have considered as his climax. I do not think that the two opinions are in decided contradiction to each other. To be physiologically normal is not at all a fundamental condition in art; and we cannot deny the legitimacy of the taste which regards that which is entirely sound and healthy as commonplace, trivial, and uninteresting, and which, on the contrary, is fascinated by that which approaches the border of disease and even goes beyond it.

Many of the best musicians, for instance, and some of the greatest admirers of Beethoven, prefer his latest works, and consider them the most interesting, although the influence of his deafness upon them is apparent to others.

In poetry, we rank some poems among the highest productions of art in which the imagination of the poet goes far beyond the normal region of the mind :

“The poet’s eye, in a fine frenzy rolling,
Doth glance from heaven to earth, from earth to heaven.”

Thus it seems to me perfectly natural that the peculiar poetical haze which is produced by the diffusion of light in Turner’s pictures after 1831 should have a particular attraction for many of Turner’s admirers. On the other hand, passing over the faults, we discover in these pictures peculiar merits, and we recognise that the great artist continued in many ways to improve even at a time of his life when his failing sight began to deprive his works of general favour. I cannot, however, defend the opinion of those who are enraptured with Turner’s pictures belonging to a still later period—who consider a picture beautiful which, in consequence of this optical defect, is entirely disfigured and defaced, and who, calling this Turner’s style, would like to form it into a school and imitate it. They resemble the porter of a certain dealer in works of art, who one day, when he had to deliver the torso of a Venus at a gentleman’s house, answered the servant, who had expressed his astonishment that his master should have bought a thing without head, arms, or legs, “You don’t understand; that’s just the beauty of it.”

I show you here first a picture which is copied from an oil-painting in the South Kensington Museum. This picture was not exhibited till the year 1833, but it was painted some time before, and from sketches taken in Venice previous to any change in Turner’s sight. I shall now try so to change this picture, by an optical contrivance, as to make it resemble the pictures he painted after 1839. You must, of course, not expect to see in this rough representation, which a large theatre necessitates, anything of the real beauty of Turner’s pictures. Our object is to analyze their faults.

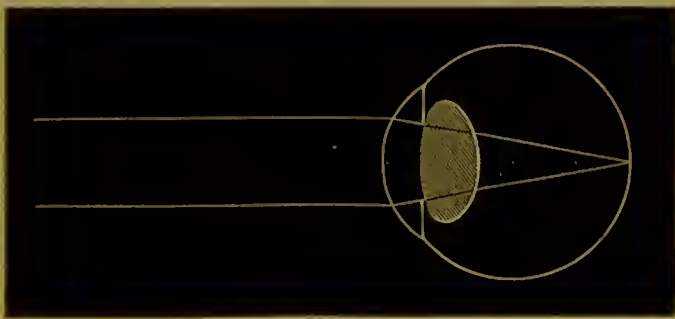
In order to show you in a single object what you have already observed in the general aspect of a picture, I choose purposely a tree, because there are no trees in the “Venice” you have just seen, and

more particularly because after the year 1833 Turner painted trees that were unknown to any botanist, had never been seen in nature nor been painted by any other artist. I do not think it likely that Turner invented a tree he had never seen; it seems to me more probable that he painted such trees because he saw them so in nature. I searched for them with the aid of the lens, and soon discovered them. Here is a common tree: the glass changes it into a Turner tree.

Let us now turn from the individual case of a great artist to a whole category of cases, in which the works of painters are modified by anomalies in their vision—I mean cases of irregularities in the refraction of the eye. The optical apparatus of the eye forms, like the apparatus of a photographer, inverted images. In order to be seen distinctly these images must fall exactly upon the retina. The capacity of the eye to accommodate itself to different consecutive distances, so as to receive on the retina distinct images of objects, is called accommodation. This faculty depends upon the power of the crystalline lens to change its form. The accommodation is at its greatest tension if we adapt our eye to the nearest point. It is, on the contrary, in complete repose if we adapt it to the farthest point. The optical state of the eye during its adaptation for the farthest point, when every effort of accommodation is completely suspended, is called its refraction.

There are three different kinds of refraction: firstly, that of the normal eye; secondly, of the short-sighted eye; thirdly, of the over-sighted eye.

Fig. 1.

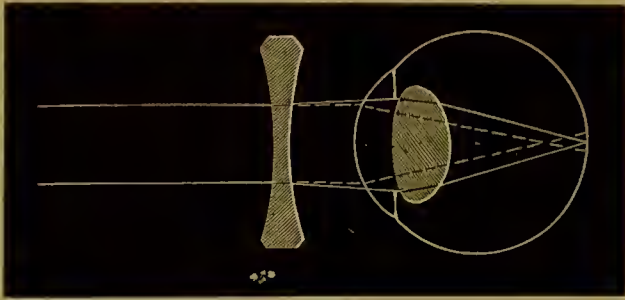


1. The normal eye, when the activity of its accommodation is perfectly suspended, is adjusted for the infinite distance; that is to say, it unites upon the retina parallel rays of light (Fig. 1).

2. The short-sighted eye has, in consequence of an extension of its axis, a stronger refraction, and unites therefore in front of the retina the rays of light which proceed from infinite distance. In order to be united upon the retina itself the rays of light must be divergent; that is to say, they must come from a nearer point. The more short-sighted the eye, the stronger must be the divergence; such an eye, in order to see distinctly distant objects, must make the rays from a distant object more divergent, by aid of a concave glass.

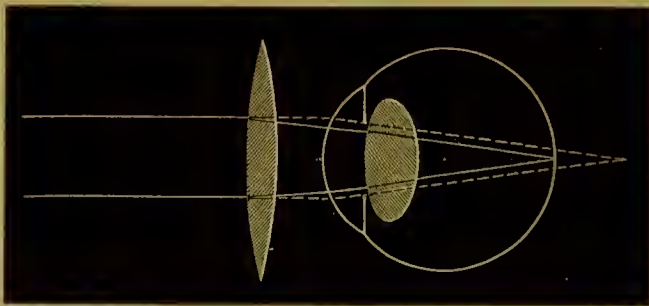
We determine the degree of short-sightedness by the power of the weakest concave glass that enables the eye to see distinctly at a great distance (Fig. 2).

Fig. 2.



3. The over-sighted, or hypermetropic eye, on the contrary, has too weak a refraction: it unites convergent rays of light upon the retina; parallel or divergent rays of light it unites behind the retina, unless an effort of accommodation is made. The degree of hypermetropy, or over-sightedness, is determined by the focal distance of the strongest convex glass with which objects can still be distinctly seen at a great distance (Fig. 3).

Fig. 3.



Hypermetropy has no essential influence upon painting; it only reduces the power of application, and must therefore be corrected by wearing convex glasses. This can never be avoided if the hypermetropy is so great as to diminish the distinctness of vision. Short-sightedness, on the contrary, generally influences the choice of the subject of the artist and also the manner of its execution. As a very small handwriting is an indication of short-sightedness, so we find that artists who paint small pictures, and finish the details with great minuteness and with fine touches of the brush, are mostly short-sighted.

Sometimes the shape of the eye diverges from its normal spherical form, and this is called astigmatism. This has only been closely investigated since Airy discovered it in his own eye. Figure to yourself meridians drawn on the eye as on a globe, so that one pole is placed

in front : then you can define astigmatism as a difference in the curvature of two meridians, which may, for instance, stand perpendicularly upon each other ; the consequence of which is a difference in the power of refraction of the eye in the direction of the two meridians. An eye may, for instance, have a normal refraction in its horizontal meridian, and be short-sighted in its vertical meridian. Small differences of this kind are found in almost every eye, but are not perceived. Higher degrees of astigmatism, which decidedly disturb vision, are, however, not uncommon, and are therefore also found among painters. I have had occasion to examine the eyes of several distinguished artists which presented such an anomaly, and it interested me much to discover what influence this defect had upon their works. The diversity depends in part upon the degree and nature of the optical anomaly, but its effect shows itself in different ways, according to the subjects the artist paints. An example will explain this better. I know a landscape-painter and a portrait-painter who have both the same kind of astigmatism ; that is, the refraction of the vertical meridian differs from the refraction of the horizontal one. The consequence is that their sight is normal for vertical lines, but for horizontal lines they are slightly short-sighted. Upon the landscape-painter this has hardly any disturbing influence. In painting distant views sharp outlines are not requisite, but rather undefined and blending tones of colour. His eye is sufficiently normal to see these. I was struck, however, by the fact that the foreground of his pictures, which generally represents water with gently-moving waves, was not painted with the same truthfulness to nature as the middle and back ground. There I found short horizontal strokes of the brush in different colours, which did not seem to belong to the water. I therefore examined the picture with a glass, which, when added to my eye, produced the same degree of astigmatism as existed in the painter's eye, and the whole picture appeared much more beautiful, the foreground being now as perfect as the middle and back ground. In consequence of this artificially-produced astigmatism, I saw the horizontal strokes of the brush indistinctly, and so mixed together that through them the colour and transparency of the water were most exquisitely rendered.

Upon the portrait-painter astigmatism had a very different influence. He was held in high esteem in Paris, on account of his excellent grasp of character and intellectual individuality. His admirers considered even the material resemblance of his portraits as perfect ; most people, however, thought he had intentionally neglected the material likeness by rendering in an indistinct and vague manner the details of the features and the forms. A careful analysis of the picture shows that this indistinctness was not at all intentional, but simply the consequence of astigmatism. Within the last few years the portraits of this painter have become considerably worse, because the former indistinctness has grown into positively false proportions. The neck and oval of the face appear in all his portraits considerably

elongated, and all details are in the same manner distorted. What is the cause of this? Has the degree of his astigmatism increased? No; this does not often happen; but the effect of astigmatism has doubled, and this has happened in the following manner:—An eye which is normal as regards the vision of vertical lines, but short-sighted for horizontal lines, sees the objects elongated in a vertical direction. When the time of life arrives that the normal eye becomes far-sighted, but not yet the short-sighted eye, this astigmatic eye will at short distance see the vertical lines indistinctly, but horizontal lines still distinctly; and therefore near objects will be elongated in a horizontal direction. The portrait-painter, in whom a slight degree of astigmatism manifested itself at first only by the indistinctness of the horizontal lines, has now become far-sighted for vertical lines, and therefore sees a distant person elongated in a vertical direction; his picture, on the contrary, being at a short distance, is seen by him enlarged in a horizontal direction, and is thus painted still more elongated than the subject is seen; so the fault is doubled. I shall be able to show this more clearly by experiments.

The vertical and horizontal lines of this diagram (Fig. 4) are reflected with equal distinctness upon the screen by the spherical apparatus. Those among my audience who have a decided form of astigmatism will, nevertheless, see them differently. Those whose sight is normal will only observe a difference after I have added a cylindrical lens to this apparatus, and thus made it astigmatic (Fig. 5).

Fig. 4.

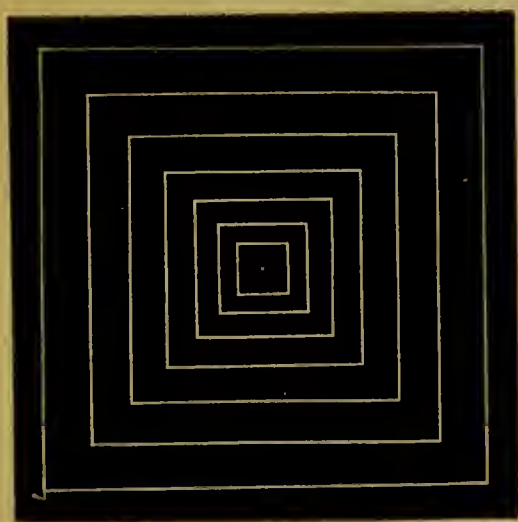


Fig. 5.



Ordinary spectacle glasses are worked by a rotating movement on the surface of a sphere; cylindrical lenses are worked by moving the glass backwards and forwards upon a cylindrical surface. Such glasses produce an optical effect only in one direction. If instead of

white lines I make the experiment with coloured lines, it will show the mixing of colours produced by astigmatism; and if I now turn the axis of the lens, you will observe the effect of different forms of astigmatism.

I show you here a square (Fig. 6): if I added a cylindrical concave glass, with its axis placed horizontally, the square becomes an oblong.

In order to show you how it is possible that the same eye may see an object at too great a distance elongated in a vertical direction, and, on the contrary, one that is too near enlarged in a horizontal direction, I need only place this cylindrical glass before or behind the focus of the apparatus without turning the axis, and you will then see the square, first elongated in a vertical direction (Fig. 7), and then enlarged in a horizontal direction.

Fig. 6.



Fig. 7.



Lastly, I show you a portrait. Imagine to yourself that it represents the person whom the astigmatical painter is painting; then, by aid of the cylindrical glass you can form an idea how the painter sees this person.

If I alter the position of the glass, the portrait assumes the form in which the painter sees his own painting on the canvas. This will explain to you why he paints the portrait still longer than he sees the person.

With regard to an anomaly of sight, which seems almost foreign to the subject of painting—I mean colour-blindness—I will also say a few words here, as the subject seems to be regarded with particular interest in England.

What we call colour-blindness is a congenital defect of vision, which is characterized by the absence of one of the three primary sensations of colour. The primary sensations of colour are red, green, and violet, according to Thomas Young and Helmholtz; or

red, green, and blue, according to Maxwell. When, as may easily happen, to this defect is joined a decided talent for painting, drawing alone ought to be attempted, because so absolute a defect will soon assert itself. But we meet with slighter degrees of colour-blindness, where the perception of red is not entirely wanting, but only considerably diminished; so that, for instance, an intense or strongly illuminated red can be perceived as such, while a less intense red appears green. This moderate degree of colour-blindness does not always deter people from painting. A proof of this I saw at the last year's Exhibition, in a picture which represented a cattle-market. The roofs of the surrounding houses were all painted red on the sunny side, green in the shadow; but—what particularly struck me—the oxen also were red in the sun, green in the shadow. The slighter degrees of this anomaly, in the form of an insufficient perception of colours, have probably been the real cause why several great artists, who have become famous on account of the beauty of their drawing and the richness of their compositions, have failed to attain an equal degree of perfection in colouring.

In opposition to these isolated cases, I have to draw your attention to other cases which happen more frequently, and in advanced age, in consequence of a change in the perception of colours. They do not arise from a deficient function of the nervous apparatus of the eye, but in consequence of a change in the colour of the lens.

The lens always gets rather yellow at an advanced age, and with many people the intensity of the discoloration is considerable. This, however, does not essentially diminish the power of vision. In order to get a distinct idea of the effect of this discoloration, it is best to make experiments with yellow glasses of the corresponding shade. Only the experiment must be continued for some time, because at first everything looks yellow to us. But the eye gets soon accustomed to the colour, or rather it becomes dulled with regard to it, and then things appear again in their true light and colour. This is at least the case with all objects of a somewhat bright and deep colour. A careful examination, however, shows that a pale blue, or rather a certain small quantity of blue, cannot be perceived even after a very prolonged experiment, and after the eye has long got accustomed to the yellow colour, because the yellow glass really excludes it. This must of course exercise a considerable influence when looking at pictures, on account of the great difference which necessarily exists between real objects and their representation in pictures.

These differences are many and great, as has been so thoroughly explained by Helmholtz. Let us for a moment waive the consideration of the difference produced by transmitting an object seen as a body on to a simple flat surface, and consider only the intensity of light and colour. The intensity of light proceeding from the sun and reflected by objects, is so infinitely greater than the strongest light reflected from a picture, that the proportion expressed in numbers is far beyond our comprehension. There is also so great a

difference between the colour of light, or of an illuminated object, and the pigments employed in painting, that it appears wonderful that the art of painting can, by the use of them, produce such perfect optical delusions. It can of course only produce optical delusions, never a real optical identity; that is to say, the image which is traced in our eye by real objects is not identical with the image produced in our eye by the picture. This is best observed by changing the light. Whoever paints in London has but too frequent opportunities of observing this. A little more or less fog, the reflexion of a cloud illuminated by the sun, suffices to alter entirely the colouring of the picture, while the colouring of natural objects is not changed in the same manner.

Let us now return to our experiment with the yellow glass, and we shall find that it affects our eye very much in the same way as a yellow tint in the light, and therefore modifies natural objects in quite a different degree from pictures. If we continue the experiment for a considerable time, the difference becomes more and more essential. As I said before, the eye becomes dulled with regard to the yellow light, and thus sees nature again in its normal colouring. The small quantity of blue light which is excluded by the yellow glass produces no sensible difference, as the difference is equalised by a diminution of sensibility with regard to yellow. In the picture, on the contrary, there is found in many places only as much blue as is perfectly absorbed by the yellow glass, and this therefore can never be perceived, however long we continue the experiment. Even for those parts of the picture which have been painted with the most intense blue the painter could produce, the quantity of blue excluded by the yellow glass will make itself felt, because its power is not so small with regard to pigments as with regard to the blue in nature.

Imagine now that in the course of years one of the transparent media in the eye of a painter had gradually become yellowish, and that this yellow had by degrees considerably increased in intensity, and you will easily understand the influence it must exercise upon his work. He will see in nature almost everything correctly; but in his picture everything will appear to him yellowish, and consequently, he will paint it too blue. Does he not perceive this himself? Does he not believe it if told of it? Were this the case, it would be easy for him to correct the fault, since an artist can paint in a yellower or bluer tone, as he chooses. These are two questions which are easily answered by psychological experience. He does not perceive it himself, because he does not remember that he formerly saw in a different way. Our remembrance with regard to opinions, sensations, perceptions, &c., which have become gradually modified in the course of years—not by any external influence or sudden impression, but by a gradual change in our own physical or mental individuality—is almost *nil*.

He does not believe it—I would not say because an artist rarely

recognizes what others tell him with regard to his works, but because with him as with everyone else, the impressions received through his own eye have a stronger power of conviction than anything else. "Sehen geht vor Sagen" (seeing is believing), says the old adage.

We are almost always conscious of *indistinct* vision, be it in consequence of incorrect accommodation or insufficient power of sight, especially if it is not congenital, but has gradually appeared. But it is extremely difficult, and in many cases impossible, to convince those of their defect who suffer from *incorrect* vision as to form and colour. They never become conscious of it themselves, even if it is not congenital, and the most enlightened and intelligent among them remain incredulous, or become even angry and offended when told of it. Incorrect perception of form may, however, easily be demonstrated. If in consequence of astigmatism a square appears oblong to anyone, he can measure the sides with a compass; or, what is more simple still, he can turn it so that the horizontal lines are changed into vertical ones, and *vice versâ*, and his own sight will convince him of his error. It is more difficult to demonstrate whether a person sees colours correctly or not. Such glaring mistakes as those produced by colour-blindness can be easily recognised, but faults produced by a diminished sensation of small differences in the shades of colour can only be recognised as such by the fact that the majority of persons with normal vision declare them to be faults. Such, for instance, are deviations produced by an incorrect perception of pigments, which in painting makes itself felt by constantly recurring *plus* or *minus* of a single colour in the whole picture. It may also show itself by small faults in the rendering of every colour. In discussing this subject with artists, they at once declare these anomalies to represent a school, a taste, a manner, which may be arbitrarily changed. They most unwillingly concede that peculiarities of sight have anything to do with it. It seems to me sometimes as if they considered it in a certain measure a degradation of their art, that it should be influenced by an organ of sense, and not depend entirely upon free choice, intelligence, imagination, and talent.

Thus, to return to the point from which we started, if a painter whose lens becomes yellower begins to paint in a bluer tone, it is said that he has changed his style. The painter himself vehemently protests against this opinion; he thinks that he still paints in his old style, and that he has only improved the tone of his colour. His earlier works appear to him too brown. To convince him of his error it would be necessary to remove his lens suddenly. Then everything would appear to him too blue, and his paintings far too blue. This is no hypothesis, but a fact. Patients on whom I have operated for cataract, very often spontaneously declared, immediately after the operation, that they saw everything blue; in these cases I invariably found their crystalline lens to be of an intense yellow colour. In pictures painted after the artists were considerably over sixty, the effect of the yellow lens can often be studied. To me their pictures

have so characteristic a tone of colour, that I could easily point them out while passing through a picture-gallery. As a striking example I will only mention Mulready. It is generally stated that in his advanced age he painted too purple. A careful examination shows that the peculiarity of the colours of his later pictures is produced by an addition of blue. Thus, for instance, the shadows on the flesh are painted in pure ultramarine. Blue drapery he painted most unnaturally blue. Red of course became purple. If you look at these pictures through a yellow glass, all these faults disappear: what formerly appeared unnatural and displeasing is at once corrected; the violet colour of the face shows a natural red; the blue shades become grey; the unnatural glaring blue of the drapery is softened. To make the correction perfect, the glass must not be of a bright gold colour, but rather of the colour of pale sherry. It must be gradually darkened in accordance with the advancing age of the painter, and will then correspond exactly with the colour of his lens. The best proof of the correctness of this statement is, that the yellow glass not only modifies the blue in Mulready's pictures, but gives truthfulness to all the other colours he employed. To make the proof complete, it would be necessary to show that by the aid of yellow glass we saw Mulready's pictures as he saw them with the naked eye; and this can be proved. It happens that Mulready has painted the same subject twice,—first in 1836, when he was fifty years of age and his lens was in a normal state, and again, in 1857, when he was seventy-one, and the yellow discoloration had considerably advanced. The first picture was called, when exhibited, "Brother and Sister; or, Pinching the Ear;" the second was called "The Young Brother." In both pictures a girl, whose back only is visible, is carrying a little child. A young peasant, in a blue smock-frock, stands to the right and seizes the ear of the child. The background is formed by a cloudy sky and part of a tree. Both pictures are in the Kensington Museum. The identity of the composition makes the difference in the colouring more striking. If we look at the second picture through a yellow glass, the difference between the two almost entirely disappears, as the glass corrects the faults of the picture. The smock-frock of the boy no longer appears of that intense blue which we may see in a lady's silk dress, but never in the smock-frock of a peasant. It changes into the natural tint which we find in the first picture. The purple face of the boy also becomes of a natural colour. The shades on the neck of the girl and the arms of the child, which are painted in a pure blue, look now grey, and so do the blue shadows in the clouds. The grey trunk of the tree becomes brown. Surprising is the effect upon the yellowish green foliage, which, instead of appearing still more yellow, is restored to its natural colour, and shows the same tone of colour as the foliage in the earlier picture. This last fact is most important to prove the correctness of my supposition. My endeavour to explain it became the starting-point of a series of investigations to ascertain the optical qualities of the pigments used in painting, and thus to enable us to

recognize them by optical contrivances, when the vision of the naked eye does not suffice to analyze the colours of a picture.

When I had the pleasure of showing this experiment with Mulready's pictures to Professor Tyndall, he drew my attention to the fact that one single colour, namely, the blue of the sky, was not affected by the yellow glass. The blue of the sky was almost the same in both pictures. I could not at once explain the cause of this, but I discovered it afterwards. The fact is, it is impossible to change the sky-blue of the first picture so as to form a colour that looks like it when seen through a yellow glass. If more white is added, the sky becomes too pale; if a deeper blue is used, it becomes too dark. Mulready was thus forced to content himself by giving to the sky in his later pictures the same colour as in the earlier ones.

If we look at Mulready's earlier works through the same yellow glass, they lose considerably in beauty of colouring: the tone appears too weak; the shadows brown; the green, dark and colourless; we see them as he saw them, and understand why he became dissatisfied with them and changed his colouring.

It would be more important to correct the abnormal vision of the artist than to make a normal eye see as the artist saw when his sight had suffered. This unfortunately can only be done to a certain extent.

If it is the dispersion of light which, as in Turner's case, alters the perception of nature, it can be partly rectified by a kind of diaphragm with a small opening (Donders' sthenopæical spectacles).

In cases of astigmatism, the use of cylindrical glasses will completely correct the aspect of nature, as well as of the picture. Certain anomalies in the sensation of colour may also be counteracted to some extent by the use of coloured glasses; for instance, by a blue glass, when the lens has become yellow, as in Mulready's case.

If science aims at proving that certain works of art offend against physiological laws, artists and art-critics ought not to think that by being subjected to the material analysis of physiological investigation, that which is noble, beautiful, and purely intellectual will be dragged into the dust. They ought, on the contrary, to make the results of these investigations their own. In this way art-critics will often obtain an explanation of the development of the artist, while artists will avoid the inward struggles and disappointments which often arise through the difference between their own perceptions and those of the majority of the public. Never will science be an impediment to the creations of genius.

[R. L.]

Royal Institution of Great Britain.

WEEKLY EVENING MEETING.

Friday, March 19, 1875.

SIR FREDERICK POLLOCK, Bart., M.A., Vice-President, in the Chair.

RICHARD LIEBREICH, M.D., M.R.C.S., M.R.I.

On the Real and Ideal in Portraiture.

GREEK sculpture, arriving at its highest development, fixed for the representation of the deities types of ideal beauty. Ever since, sculptors have divided themselves into such as followed those laws of beauty derived from the study of the classic works of art, and such as worked after nature, putting the truth derived from it above the perfect beauty. In our times certain subdivisions have been observed, forming various shades within each of these two schools, without, however, effecting a real amalgamation of the two different tendencies. Thus, in the idealistic school, some have strictly adhered to the antique; others, though making the study of the antique their starting-point, have yet, in their compositions, made concessions to our modern feelings. On the other hand, among the realists, some, though guided by the direct observation of nature, have yet adhered to the principles of antique sculpture as far as the choice and representation of the subject are concerned, whilst others have preferred the exact copying of actualities.

In painting, idealists and realists are certainly as far apart as in sculpture. There exist, however, in the different individualities of the artists almost all the transitions from one tendency to the other.

I shall therefore keep principally to sculpture, when trying to analyse the question of the real and ideal in portraiture. Among the Greeks the portrait, as representing the real, formed originally the contrast to the ideal creations of the types of the deities. It was only much later that in the portrait also the contrast showed itself distinctly between real and ideal; and especially so from the time when, under the successors of Alexander the Great, Lysistratus came to the realistic extreme, and made casts after nature, filling them with wax, and retouching them afterwards.

In the Roman period the realistic portrait developed itself to such a perfection as still to give to this branch of art value and significance, when sculpture in general was rapidly approaching degeneration. The contrast between the idealistic and realistic portrait in this

period is principally based upon the purpose of the representation. The custom of representing as deities the emperor and his family, his friends, the higher functionaries, and even private persons of no merit, led to the imitation of the ideal types of the deities, with a face more or less approaching this ideal type. To this the purely iconic realistic bust, showing the individual in his real aspect, originally formed a sharp contrast, though occasionally a sort of confusion was produced by a realistic head being placed on an idealistic body.

Though no such reason any longer exists in our time for so sharp a separation, yet the separation itself still exists. Upon what conditions, then, is it based? This we shall try to show by examples, and in order to enable us to do so, we must, above all, see these examples in a proper light, on the importance of which I should like to make a few observations.

The importance of the background and light for the impression to be produced by pictures is generally acknowledged; it appears, however, that the public are not so generally conscious of the fact that the background is quite as important for sculpture, and that for it the right light becomes a vital question. Otherwise an improvement in the system of exhibiting classic works of art in museums would be insisted upon; and in private collections the places assigned to sculptures would not be allowed to depend upon accidental circumstances. Thus in the Louvre we see its jewel, the Venus of Milo, placed in a bad light. In the South Kensington Museum, the highly interesting busts of the Florentine School of the fifteenth century are placed in such a manner that the height of their position, the colour of the background, and the light falling upon them, render it all but impossible to examine them, whilst very trivial objects have received the best position and light. In the National Portrait Gallery, the busts are set on shelves 9 feet from the floor and in front of the windows; so that they can only be seen from below, while they are lighted from the front and from below. Among the faulty arrangements for exhibiting sculpture we must mention also that of the Royal Academy. It will certainly be improved, as soon as the public begin to take an interest in this matter and to understand it. For this purpose it is only necessary to afford an opportunity of seeing a well-arranged exhibition. I convinced myself of the simple means by which such an arrangement may be effected, when visiting the exhibition in Milan in September last. We have attempted to give you an idea of the Italian arrangement, of which you will find an imitation in the Library. Several distinguished artists have kindly sent in some of their works for this purpose, and it will surely afford you a truly artistic enjoyment to see them after the lecture. There you will receive the general impression of sculpture exhibited in the right light; here we shall analyse the details of this effect, and that with reference to the face chiefly.

The absolute dependence of sculpture on the light that falls upon it might be considered a defect in the art, and confirm the not

infrequent assertion that sculpture is altogether unfit for portraiture. In order to be perfectly just, let us enter into the argument at once. The painter, the draughtsman, the photographer, if about to make a portrait, carefully select the right light, being convinced that to a great extent the success of the portrait depends upon this. As soon as they have fixed upon the effect of light which they wish to produce in their picture, this effect will remain substantially the same under all circumstances, although the general impression of an oil painting may be slightly modified according to the light which falls on it, and according to its surroundings. The sculptor, on the contrary, shapes a body which may be exposed to all the various effects of light to which the original might be exposed, and, amongst others, to all those under which the painter would declare it impossible to paint the original. What painter, for instance, would consent to paint a portrait with the light coming from the front and from below? The effects of light and shade characteristic for the human face disappear completely under such circumstances. Let anyone cover a human face with white paint and throw a light upon it from the front and from below; then it will be found that the features disappear completely; yet marble busts are frequently exposed to this kind of light.

The reason why the human face appears to advantage only when light is thrown upon it more or less from above, and why its likeness can be correct only under such a light, is one very deeply rooted. The nature of man, his erect bearing, the direction of his look, everything that in his appearance distinguishes him from the animal bent to the earth, necessitates that conformation of the forehead, the nose, the mouth, &c., which is characteristic of the human face, and which was required by reason of the sunlight coming to him chiefly from above. And therefore, also, it is only the light coming more or less from above that shows the forms of his features in a characteristic way. Thus, it is no exorbitant demand that sculpture ought to be seen in the same light in which the original appears to the best advantage, and which every painter is free to choose for himself and fix in his picture.

In the plastic reproduction of the body, the coarser and more general forms may be seen with tolerable distinctness, even when a false light falls upon them, as the stereoscopic view aids the spectator. In the case of the more subtle features of the face, however, the stereoscopic impression plays but a subordinate part, on account of the slight difference of depth of the characteristic features. The true impression of the face in a bust therefore depends almost exclusively upon the play of light and shade which gives to the one-coloured material the intended aspect. And this light and shade will be judiciously disposed only if the portrait is looked at as nearly as possible from the direction and in the light in which the artist intended it to be seen.

A closer examination of the technical details will convince us that this does not only apply to works of sculpture which specially aim at

a picturesque effect, but also to those which keep strictly to the form. The more elaborate the modelling, the more expressive the features, the richer the detail in the bust, the more it has to gain by a correct light and to lose by a false one. That is the reason why, in exhibitions arranged without due consideration to light, we find that levelling influence which places in the same range the best and the worst, and thus gives the finishing stroke to that infinitely wearisome impression produced by the pale marble heads placed one near the other on a shelf, which the spectator passes as quickly as possible in order to get to the more attractive picture gallery of the Royal Academy.

Let us now compare, with correct and with false light successively, one realistic and one so-called idealistic bust.

We will so turn these busts round a vertical axis that by degrees everyone in the various parts of the theatre may obtain a fair front view of them. I wish we were able to turn the revolving table round a horizontal axis as well, in order to avoid the foreshortening, which must be inconvenient to those sitting in the higher rows of the theatre. This, however, would have required too complicated an apparatus.

The idealistic bust is the portrait of a great poet; the realistic that of a natural philosopher. I daresay that at first sight the greater part of the audience, especially those sitting at a distance, will prefer the idealistic bust. We shall see at once whether this feeling will hold good when we compare the two busts with reference, *firstly*, to technical execution; *secondly*, to anatomical correctness and truth to nature; *thirdly*, to likeness; and, *fourthly*, to life-like expression and intelligent conception of the individuality.

To begin with the technical execution. On superficial inspection, the smooth and soft surface of the idealistic bust may speciously charm the eye; a somewhat closer examination, however, will show that a vagueness of outline and want of detail are concealed behind this easily attainable external finish, and that this particular idealistic bust at least is greatly inferior to this realistic one. In a still higher degree this is the case when truth to nature and anatomical correctness are considered. If we hold this skull close to the realistic bust, to whatever part of it we may direct our attention, we shall always be able to discern the same correct proportions in the corresponding part of the bust; and, so to speak, to trace the bone in it. In the other bust, on the contrary, anything as well as a skull might be hidden below the conventionally-shaped surface; and in those places where the shape of the bone is but little covered by fleshy parts—as, for instance, at the forehead, the temples, the nose, and the under jaw-bone—it is easy to prove the anatomical impossibilities. The third point, that of likeness, might appear to be entirely implied, since anatomical anomalies necessarily include unlikeness. This, however, is only partially true, for a certain likeness of the whole physiognomy is not incompatible with dissimilarities in some of the

features, as is proved by caricature. Two portraits in oil, by Phillips, one of which (the original) is in the possession of Lord Lovelace, and a copy of it in the National Portrait Gallery, and the other in possession of Mr. Murray, as well as more than twenty different engravings, which are to be seen in the British Museum, and which represent Lord Byron at different periods of his life, from boyhood to the time of his death, provide us with a sufficiently exact idea of his personal appearance to enable us to judge of the likeness of this bust. If I deny this likeness, you may, perhaps, feel inclined to reply: "But we recognized it at once." Allow me, however, merely to cover with two fingers the well known curl over the forehead, and then to ask you whether you would still recognize the original. What remains uncovered, although it is the entire face, might as well belong to any other person—or, to speak more correctly, it could belong neither to Byron, nor to any other specimen of the human race.

On the other hand, if we cover any portion of Dr. Ray's face, the uncovered part will characterize the individuality of that learned man, as well as his own face would have done if partly covered in the same way. And we can easily prove the fidelity of the likeness by comparing the bust with the different engravings of Dr. Ray, one of which, in the British Museum, made about the same time as the bust, resembles it most.

But the most striking difference between the two busts is shown when they are compared as to life-like expression, and the intelligent conception of individuality.

How shall we imagine a spark of that wild poetical genius flashing out of these flat button hole-shaped eyes without pupils? How can we imagine the sarcastic smile of the merciless satirist playing round these stiff conventionally-shaped lips?

How different is the bust of Dr. Ray! Full of life and truth, it shows the grave earnest look of the keen observer of nature, the deep lined features of the unwearied toiler, who published most important books in such widely different subjects as botany, zoology, philology, and theology. It is true that we can only fully appreciate the expressiveness of these features when we look at them in the right light; for if we change the light, so that it comes from the front and from below, the whole expression vanishes, or, at least, is entirely changed; and while, under such a light, the idealistic bust becomes almost like a piece of white paper, the realistic bust, you will observe, having much more to lose, appears to still greater disadvantage.

After what I have said, it might appear as if I wished to speak against idealism in portraiture altogether. I wish to guard against being thus misunderstood, and therefore state expressly that it is to one special tendency, falsely called idealistic, and of which this bust is a specimen, that my objections are directed; for I consider the true idealism in portraiture consists in something widely different from the erroneous imitation of mere externals of ideal classical works.

We will now show the busts in light coming from below, and for

those who are at too great a distance to be able to distinguish the details of the features, we will show two photographs of each bust, the one taken in light coming from above, at an angle of 45 degrees, the other taken in light coming from below at the same angle.

If I look at these busts in this bad light (and to such light busts are only too frequently exposed) I no longer wonder at the remarks one occasionally hears in conversation, such as, "Did you ever see any likeness in a portrait bust?" or, "I am very fond of painting, but I cannot see anything in sculpture." Such remarks express the feelings of a great part of the public with reference to sculpture.

After what we have seen, the idealistic, stylistic, classic artist, or whatever you choose to call him, will have the advantage over the realistic artist when their respective works are seen in the same bad light, and he might feel himself confirmed in his tendency if he reckons that his busts will never have the chance of being seen in a better light. On the other hand, the realist must take care not to be misled in the opposite direction, by the conviction that the merits of his tendency can only be appreciated in a perfectly correct light; for confiding in the sharpness of that light, he might be induced to render details which are not characteristic and essential, but merely accidental.

Now the question arises, What should be called *accidental* and what should be called *essential* in a face? Each artist will give a different answer to this, and the view he takes will be characteristic of his whole tendency, and, in any given case, will determine the nature of his work. This might seem to imply that nothing generally applicable could be said on the subject. This, however, is not the case, for up to a certain point it is possible to determine what must be considered essential, and not only the artist but even the public may derive some advantage from such an analysis.

Let us start from an anatomical point of view, and begin with the bone. Concerning the skull, the question may be easily and absolutely answered thus: Nothing in the skull ought to be considered accidental and of secondary importance. The general proportions, as well as each detail of the shape, must be respected as characteristic of the individual, and scrupulously adhered to without any arbitrary modification. There is no occasion for supporting this principle by any phrenological or physiognomical consideration; the undeniable fact being that, in a portrait most excellently finished in every other respect, the slightest arbitrary modifications of the skull will never fail to produce a defect in likeness. All painters of good portraits, whatever may be the manner they adhere to, whether they have any idealistic or realistic tendency, will be found to submit strictly to this law.

Not so the sculptors, at least not those belonging to a certain school. Perhaps the forehead of the Olympian Jupiter, the neck of the Apollo Belvedere, the thorax of the torso of Hercules, are before their mind's

eye, when, having to make the portrait of a mortal, they indulge in modifications which classical antiquity was never guilty of in the portrait. The consequence of this is not merely that the likeness of the portrait is lost, but, moreover, a production results which the natural philosopher on close examination must declare not to belong to the human species in its present state of development. The custom of honouring civic virtues, liberality, activity for the public good, &c., by transmitting the memory of those who had such merits to posterity by means of portraits and busts, affords us ample opportunity for comparison between the portraits of the same person made by sculptors and painters. We may thereby easily convince ourselves of the falsification of individuality—I can use no milder expression—into which sculptors of the so-called classical or idealistic school in portraiture have an irresistible tendency to fall.

In order to settle the question which of the two was right, the painter or the sculptor, in making two entirely different portraits of the same person, it is not absolutely necessary to know the original, where the features and especially the formation of the cranium and the proportions of the facial bones in the bust contain anatomical impossibilities. Let no one imagine that it would be easy or even possible to alter the shape of the human skull and yet to remain within the limits of physiological truth.

It is a more difficult and complicated task to answer “what is essential and what is accidental” with reference to the skin. Whilst one school of painters renders only a general impression of colour corresponding to the complexion of the individual, the realists copy carefully all the minute irregularities of the skin. Among the sculptors the same contrasts are met with. Some imitate every small detail in the skin, whilst others do as little justice to its natural peculiarities as to any other anatomical element. Thus they work the surface of the marble as smoothly as possible, giving, it is true, by skilful manipulation, a very soft and smooth appearance to the stone, but nothing which reminds us of flesh and blood. The hair, the flesh, the drapery, and the pedestal, all appear to be of the same substance, and remind us only of the material of which the artist forms them, and not of those substances which he intends to represent. The neglect of anatomical details might be traced to the fact, erroneously applied to portraiture, that the Greeks in their *ideal* compositions did not mark the muscles and veins. In the Greek as well as in the Roman portraits, however, we find the character of the skin carefully expressed; and all characteristic lines which are the lasting effect of certain motions of the facial muscles recurring frequently in the habits of the individual are thus carefully rendered. In order to get thoroughly acquainted with these lines and folds, we must study the muscular actions by which they are produced. Let us begin with the forehead.

The muscles of the forehead are very thinly and flatly spread out in a state of repose, therefore they alter but slightly, through their

substance, the shape of the forehead as determined by the bone. They are, however, of the greatest importance in various mimic motions of the face, inasmuch as they produce the folds in the skin of the forehead, and also the position and alteration of shape of the eyebrows. The broadest of these muscles, the frontalis, by means of its chief substance lifts the eyebrows straight up, and thereby forms on the forehead parallel folds which, with slight undulations, run horizontally over the whole forehead, bending down to the temples on both sides in curved lines. According to the thickness of the skin, and especially according to the degree of thickness of the layer of fat underlying the skin, these folds are more or less numerous, and broader or narrower; and they are most numerous in lean old men with thin skin. In the treatises on mimics and physiognomy, and on anatomy of expression, these horizontal folds of the frontal skin, and the uplifting of the eyebrows, are usually spoken of as giving to the face the expression of attentiveness, of astonishment, and of cheerfulness. It is a new proof how irrational it is to characterise such motions of the muscles taken isolatedly, because, according to their combination with other movements of other parts of the face, just the contrary physiognomic expression may be produced.

Thus the horizontal folds and the lifted-up eyebrows are certainly expressive of attentiveness and astonishment, if the eyes are widely open; on the contrary, if the upper lids are only imperfectly lifted, those actions of the frontal muscles produce the expression of fatigue and drowsiness. Even without the real existence of drowsiness or fatigue, this expression will be found in all cases in which the muscle which lifts the upper eyelid has become weak, or, what comes to the same thing, where, in consequence of the lengthening of the skin of the eyelid, the task of lifting the eyelid has become too heavy for the strength of the muscle whose function it is to lift it. The material effect of such conditions is much stronger than that of the mimic motions, which, even if they have become a habit, nevertheless do not act mechanically in such a decisive manner as those constant contractions which are required to assist the insufficient muscle of the eyelid.

As an instance, I show you here the cast of a marble bust from the fifteenth century, which is in the Museo-Nationale at Florence. It is done by Benedetto di Majano, and is worked in the manner characteristic of the Florentine school of that period. You see that the horizontal folds on the forehead, which are very strongly expressed, and strictly copied from nature, do not at all produce the expression of astonishment, attention, or cheerfulness. They evidently do not indicate any transient expression such as springs up suddenly, and dies away as quickly, and which, for that very reason, would be unfit for a portrait; but they do indicate such an habitual expression as was characteristic of the appearance of the individual. Measurements will prove this very easily. The eyebrows (you will observe) are, at their extremities, lifted up a quarter of an inch above their original length. Though the skin is considerably stretched

between the eyebrows and the margin of the upper lids, yet above the cartilage of the lid a broad fold has been formed, and as, at the same time, the slit of the lids is only very moderately opened, it shows clearly that the skin of the upper lid must be so considerably lengthened, that without the effort of the muscle of the forehead, and the lifting of the eyebrows, it would necessarily overhang the lid. Thus, the opening of the eye would overtask the strength of the muscle to which this function pertains. Imagine to yourselves this bust with smooth forehead, and the likeness would at once disappear. Therefore it is that such folds of the skin must not be considered as accidental, but as essential.

It is the same with the vertical folds of the forehead. They are produced by the contraction of two muscles proceeding from the centre of the lower margin of the forehead, and taking a horizontal direction towards the eyebrows. They draw together the two eyebrows, and thus form in the middle of the forehead, just above the upper part of the nose, one or more vertical folds; and if the contraction is very energetic, a series of short vertical folds may be seen also above the inner half of the eyebrows. The mimic expression of seriousness, of effort, of deep meditation, of passionate anger, is transiently thus produced. Any lasting or habitual contraction of these muscles, caused by any reason whatever, leaves stationary vertical lines and folds on the forehead, as you see in this portrait of the Bishop of Fiesole, made by Mino da Fiesole, the original of which is in the Church of Fiesole; and also on this portrait of an unknown of about the same period. Only very rarely we find on the forehead, as a lasting feature, that form of folds produced by the simultaneous straining of all the muscles of the forehead, which give an expression of the deepest pain. There the eyebrows are drawn together with their inner extremities, and, at the same time, drawn much upwards, as is so beautifully expressed in the Laocoon. But, for the portrait, this folding of the skin of the forehead, and this position of the eyebrows, need scarcely be taken into consideration, because they do not form any lasting physiognomical characteristic.

A lasting fold is formed by the skin, to a degree increasing with age, at the two sides of the mouth, descending from both sides of the nose. On the cheeks and under the chin regular folds, such as appear in the bust by Benedetto di Majano, are only seen in later age, and even then but rarely so strongly marked as in the before-mentioned bust. On the contrary, numerous minute folds will show themselves much earlier in life in those places of the facial skin where it is thinnest, that is to say, above the upper and under the lower eyelid up to the margin of the socket of the eye. Here the slightest modifications in the quantity of fat below the skin manifest themselves so distinctly that alterations may be observed even at different times of the day, and may be very quickly produced by any little change of the general state of health. This kind of formation of folds in that part of the skin exercises great influence on the expression of the face.

The blood-vessels of the face are of importance for the painter in so far as the colour of the skin in the different parts of the face depends upon them. For the sculptor, only certain large veins are of importance, which, especially with men in later life, come out so strongly on the forehead, the temples, and the neck, that they stand out from the surface of the skin, and have a characteristic influence on the countenance. In the body, and chiefly in the extremities, the muscles are visible, even if not contracted. In the face they do not come out separately, firstly, because they are so thin, and secondly, because they are so much covered by a relatively thick layer of fat and by the skin, that only their effect on the form and movement of the covering parts can be noticed. Let us imagine these covering parts removed, and glance briefly on those muscles the exact study of which is of such great importance for the artist who has to represent the human face. The muscles of the forehead we were obliged to describe in order to explain their effect on the formation of folds in the skin of the forehead. On the nose, besides those fascicles of frontal muscles which go down to its upper part, we find two muscles: first, one originating from the nasal bone and descending on both sides towards the nostrils, which, by contraction, opens the nostrils, as in the process of inspiration; secondly, one arising from the upper jaw, and descending partly to the nostrils and partly to the upper lip. This muscle lifts simultaneously the nostrils and the upper lip. Its opponent is a small muscle arising from the upper jaw above the front teeth. It is inserted into the lateral cartilage of the nostril and pulls it down. The contraction of these muscles, with the exception of the two which lift the nostrils and upper lip, usually produces only a very small but almost continual motion, viz., that which accompanies respiration, and which only under the influence of passion will be found to increase. This movement, however, though slightly apparent, is very important for the expression, inasmuch as it keeps the nostrils in that position which is characteristic of life. With the last breath, and with the consequent relaxation of muscles, the nostrils collapse, and this greatly contributes to produce the expression of death.

The common elevator of the nostrils and upper lip, if contracted very strongly, produces the expression of suffering or of disgust; if only slightly contracted, it combines with the other muscles of the cheek in their action upon the lips.

The movements and alterations of form in the lips, so very important for the expression, are produced through the alterations of tension in a circular-shaped muscle, which constitutes the principal substance of the lips. It is called the *orbicularis oris*, and the muscles coming from the upper and lower maxillary bone, and directing themselves towards its margin, act upon it in the most various combinations. These muscles are—

1. The elevator of the nostrils and of the upper lip.
2. The proper elevator of the lip.
3. The elevator of the corner of the mouth.

These three arise from the upper jaw near the orbit, and then joining themselves to the upper lip and the angles of the mouth, lift these parts by their contraction.

4. The zygomaticus arises from a process of the cheek-bone which joins the temporal bone, and is inserted into the angle of the mouth. The angle of the mouth is drawn down by the *depressor anguli oris*, arising from the base of the lower jaw, and is inserted into the angle of the mouth. The lip itself is drawn down by the *quadratus menti*, whilst the *levator menti* alone accomplishes the task of lifting the chin, and, in common with the last-mentioned muscle, enables one to pout the under lip. By strong contraction of these muscles, all the motions of the face are produced which are required for the expression of the most various passions and emotions. The consideration of these passions and emotions lies outside our subject, because any passionate expression must be unfit for representation in a portrait, since from its very nature it cannot be lasting. The small vacillations, however, in the tension of the above-mentioned muscles, are of the greatest influence on the portrait, because they produce those minute modifications of form in the lips and cheeks which, combined with the analogous effect around the eyes, are the principal contributors to the expression of the human face. Their correct choice, on the painter's part, and the true rendering of them, are identical with the right understanding of the individuality, and make the painter as well as the sculptor avoid the danger of giving to the face rigidity, lifelessness, and want of expression, instead of the repose that becomes a portrait.

The conditions acting on the mouth and on the eyes are much more similar than one might suppose to be the case. To begin with, we must be clear that what is commonly called the expression of the eyes depends only in a very slight degree on the eye itself, that is, on the eye-ball, and in the whole remaining degree on the conditions of the surrounding parts. The movements and alterations of form of the eyelids are produced in quite an analogous manner to those of the lips, viz., through the contraction of a circular-shaped muscle, the *orbicularis palpebrarum*, and of its two opponents, viz. (1), a particular elevator-muscle of the upper lid; and (2) the different muscles which displace the frontal skin and the eyebrows, and which we described when speaking of the forehead.

In the same manner as the circular-formed muscle of the mouth, that of the lids is apt to contract itself either as a whole, or only in its single parts, or to contract one part more than the other, according as it has to prevail more or less over its opponents. The mechanical effect which is thus obtained on the position of the margin of the lids, and on the shape of the whole slit of the lids, is certainly neither as extensive nor as manifold as the analogous effect of the much more complicated apparatus of the muscles of the cheeks and lips on the form of the mouth. However, the influence upon the expression is by far greater with the eye, inasmuch as the minutest

alteration in the margins of the lids would have very considerable effect upon the aspect of the eyeball.

In order to account for this, let us set apart for the moment all other influences, and supposing all the other parts of the face to be covered, and the eyeball itself perfectly immovable, the pupil looking straight forward, let us study, in one eye, the influence of the smallest alteration in the slit of the eye on the expression. We see then that the upper lid moves up and down like a curtain before the eyeball, not however in a plane, but adapting itself to the surface of the eye. This curtain at the angles of the eye is connected with another curtain formed by the under lid, which moves up and down in a similar manner, but in an opposite direction. These two connected lids cover by far the greater part of the eyeball, so that only a somewhat oval section of it becomes visible. It is this section alone which, from an æsthetic point of view, we are accustomed to consider as the eye, and the size and form of which produce the apparent size and form of the eye. I say apparent, because in reality this latter, of course, undergoes no alteration at all. If we speak of large or small eyes, we only understand by it this apparent size, which depends entirely on the width of the slit, and the conditions of the orbit. The real size of the eye is altered only in certain anomalies—for instance, at a very high degree of short-sightedness. This is not meant to imply that the effect on the expression is exclusively produced by the surroundings of the eye, and not at all by the eyeball itself. We may prove this by another experiment, where we leave the lids and eyebrows immovable, while the eyeball is made to turn on its own axis from the right to the left. Of course the pupil also moves inside the slit from one end to the other, altering the expression considerably even in one single eye, much more so if the movement is observed simultaneously in both eyes, and most of all if this movement is not only a lateral one, but is combined with an upward rolling of the eye, which naturally implies an alteration of form in the slit of the eyelid. Those movements which alter the direction of the visual line of each eye, and the relation existing between the visual lines of the two, and which also alter the position of the cornea and pupil in the opening of the eyelid, constitute what we call the look. To the look, painters, in their compositions as well as in their portraits, have always paid great attention. In several of the old masters it struck me that they had a sort of predilection for a certain direction of the look. Thus Murillo gives the preference to a look of extasy directed straight upwards, whilst Guido Reni has a certain predilection for painting an eyeball turned obliquely upwards, and he gives to this direction of the look quite a peculiar character by the posture of the head and position of the eyelids and eyebrows, imitated from the Laocoon or the Niobe. In his numerous portraits Vandyke evidently prefers the following direction of the gaze. His portraits look somewhat to the side of the observer into the distance, and in such a manner that the heads turned to the right have their eyes directed to the left; and, *vice versâ*, the

heads turned towards the left have their eyes directed so far to the right, that sometimes the iris comes quite near the right angle of the slit of the lids. Those of his portraits that have been shown in this year's exhibition of the Old Masters confirm this observation. They are twelve in number, and they have all of them the above-mentioned direction of the eyes. Of course those portraits are excepted which represent two persons speaking to each other; for instance, that of Rubens, by Vandyke, in the National Gallery.

In sculpture, the representation of the look is more difficult. There is, above all (at least in our time), the want of colour, which, by defining the pupil and the iris that surrounds it, clearly indicates the position of the eyeball. Nevertheless the direction of the eyes is to be recognized even in the ideal compositions of classic antiquity by the position of the eyelids and the shape of the visible part of the eyeball. In the portrait, however, especially in the purely iconic representations, the Greeks used to indicate the pupil by a small flattening of the eyeball, by which the shadow of the upper lid became broader, or they indicated the look in the way on which you see it here in the busts of Demosthenes, Pericles, and Alexander the Great, the beautiful originals of which are in the British Museum. In the realistic busts of the Roman time the pupil was indicated by a small hollow which gave shadow, and the margin of the iris or cornea was designated by a fine engraved circular line. The same or a similar manner of indicating the pupil has been since adopted by the majority of sculptors, and it is to be considered as a misunderstanding if sculptors of a certain tendency believed that they imitated the antique in the portrait bust, when they left the eyes perfectly expressionless, without pupil, with the lids and the eyeball shaped in a conventional curve, by which the inanimate look of the rest of the features was considerably increased.

The utility of anatomical and physiological knowledge for the artist has been repeatedly denied. As a chief support for this assertion, it has been alleged that the Greeks did not know anatomy, and moreover that the knowledge of anatomy possessed by the artists of the Renaissance and modern times rather led them to an exaggerated representation of the muscles, and caused them to indulge in complicated and unusually difficult positions of the body. We must, however, remember that though the Greeks certainly did not possess the same facilities for studying anatomy as the artists of present times, they notwithstanding possessed a perfect knowledge of that which was essential for them in anatomy. They knew the skeleton. One, cast in metal, existed in the temple at Delphi, to which Hippocrates had presented it. They possessed descriptions of anatomy; they dissected animals; and they could complete the knowledge thus acquired by the observation and the study of the nude form, not in the state of repose or weariness of a tired model as now, but in the free display of the muscles shown by the boxers and wrestlers and other competitors in the public games:

Without such means of correcting and completing anatomical

knowledge, derived only from the study of the dead body, the artist might be led to adapt it incorrectly to life. Of course this does not imply anything against the usefulness of anatomical knowledge; it only proves the necessity of completing it physiologically. As for the portrait, the advantageous influence of a thorough knowledge of anatomy, and of physiognomy based upon it, will be clearly manifest. It will preserve the realist from the petty imitation of mere accidental details by the conscious observation of those physiognomic movements of the features which are characteristic of the expression. He will learn how to ennoble his works by animation and intellectual expression, and thus he will approach the true idealism; for it is in such refinement of the material, through a clear understanding of the individuality, that we see the true idealism in portraiture, and not in mere embellishment of the features as to colour or form.

The study of anatomy is still more important for the artist belonging to the classical school. Unfortunately this view is not shared by many of those who have to regulate the course of studies in schools of art. Thus we see the artistical education often based exclusively on the copying of the antique. The consequences of this system are the imitation of certain externals, without a clear understanding of what is essential in classic art; and the incapacity of observing nature with an open mind and unprejudiced eye. Thus a tendency develops itself among the sculptors which produces those portraits falsely called idealistic, whose want of merit has not yet been sufficiently stigmatized. There is neither beauty nor art, neither truth nor power, nothing but mannerism and specious hollowness; and the pretended classicity only serves as a cloak for indecisiveness and emptiness. In this we see not only danger for the artist and his school, but at the same time a danger for the taste and interest of the public. Therefore, from this spot devoted to natural science, may I be allowed to say: Go back to nature, to the true and conscious observation of nature. They are only mediocre artists who are afraid to find in the clearness of science an impediment to their poetic flights and the inspiration of their genius. The great artists of all times knew of no such hindrances, but based all their works on the most careful study of nature, whatever were the ideals they aimed at; for they all knew that there is no beauty without truth.

Royal Institution of Great Britain.

WEEKLY EVENING MEETING,

Friday, March 1, 1878.

GEORGE BUSK, Esq., F.R.S., Treasurer and Vice-President,
in the Chair.

R. LIEBREICH, M.D., M.R.C.S., M.R.I.

The Deterioration of Oil Paintings.

OIL paintings are subject to various kinds of changes, which may be considered as diseases, requiring different treatment according to their different nature. A science needs to be formed, a pathology and therapeutics of oil paintings. The pathology would have to describe and explain those diseases and their progress, and to develop the methods by which a correct diagnosis could be arrived at in each individual case. The therapeutics would teach the remedies which might be applied either to cure or to alleviate the disease, or at least to stop its progress. A hygiene would follow, which would have to teach how to avoid pernicious influences, and which, besides, while giving precepts for the technical process of painting, would have to forestall those constitutional diseases which, even in cases where no noxious influences can be traced, are the causes of decay, after a comparatively short period of existence. As medical science is above all things based on Anatomy and Physiology, so the exact knowledge of the structure of a picture would have to be acquired previously to any study of its disease. Unfortunately, direct investigation alone can procure no such exact knowledge: on the contrary, we are obliged to enter upon a minute historical investigation of the material as well as of the technical methods adopted by artists of different schools and different periods.

The excellent works of Cennino Cennini, Mérimée, Sir Charles Eastlake, Mrs. Merrifield, and others, have already furnished most valuable material; but still the field for investigation remains unlimited; for, in order to enable us to secure the conservation of each valuable painting, we ought to know exactly how it was made. The artists of the present time would spare infinite trouble to the investigators of future times, if, along with their works, they would leave the account of their practice in the case of each picture. A treatment without exact knowledge of the normal condition, as well as of the nature of the disease, is, as we shall see, as dangerous for the picture as it would be in the case of living beings.

Professional restorers of pictures admit this danger in a general way; each of them, however, is convinced that he himself, by his

personal knowledge, skill, and care knows how to avoid it. The public pays too little attention to the subject, and therefore it occurred to me that it might be useful to give a short account of what we know about this question, of the changes to which oil paintings are exposed, as well as of the means either to avoid or to cure them.

We have to consider, first, the material on which the artist has painted, that is, as far as oil painting is concerned, principally wood and canvas.

Secondly, the priming, that is, the substance with which the surface was prepared in order to be made fit for painting.

Thirdly, the painting itself, that is, the pigments and vehicles used for it, and the liquids that were added during the painting, the mediums, megulp, siccativ, varnish, essential oils, &c.

Fourthly, the coat or coats of varnish spread over the picture.

The wood on which a picture has been painted may either warp, or get chinks in it, or become worm-eaten, or even altogether rotten. Against warping, the remedy usually applied is moisture. If the panel is very thick, it is first made somewhat thinner; then the back is moistened, and the picture is left to lie on its back for twelve to twenty-four hours, after which time it will be found to have bent straight. Of course this must not be continued longer than necessary, otherwise the convex surface, instead of becoming plane, would become concave. When straight, the picture is kept so by beads which have to be adapted in a particular way, a certain degree of shifting being allowed for the expansion and contraction of the wood.

Cracks in the wood are drawn together by inserting pieces of wood of a special shape.

Sublimate solutions are employed to destroy worms.

Trifling losses of substance are replaced by cement. Small portions of rotten wood, not extending too near the painting, are cut out and replaced by wedge-shaped pieces. If, however, the greater part, or the whole substance of the panel, is rotten, the picture must be separated from it and transferred to new wood, or rather to canvas.

This was first tried by Hacquin in Paris, and was performed successfully upon many pictures, and, among others, upon one of Raphael's Madonnas, in the Gallery du Louvre, and upon Sebastian del Piombo's 'Resurrection of Lazarus,' now in the National Gallery. The process no longer appears so very marvellous: it is generally executed in the following way:—

First of all, the surface of the picture is pasted over with gauze and paper. After that the wood is made straight by moistening, or, if necessary, by making incisions with the saw, into which cuneiform pieces of wood are driven. By means of a tenon-saw the panel is to be sawn into little squares, which must be removed by a chisel, and in this way the thickness of the wood is reduced to half an inch; it is then planed until it becomes no thicker than paper, and the rest is removed by means of a knife and with the fingers. The painting

ing thus severed from its basis, it can be fixed on canvas, if the lining is sufficiently preserved. In the opposite case, a mixture of chalk and glue, or something of the kind, must be put first, and very evenly smoothed after being dry. This done, the raw canvas has to be fixed upon it by means of a mixture of glue, varnish, and turpentine, and the substance of the picture pressed tightly and evenly against it by means of warm irons.

In order to avoid deterioration, the most minute precepts have been given for preparing the panel. It has to be taken from the best oak, or nut trees, or cedars. The wood is to be cut into boards during winter-time, and kept till autumn before being dried; it can only be prepared only in the following spring, &c. It would certainly be preferable to give up wood panels altogether for large pictures, and only to think of means to make the canvas stronger. For small pictures, panels offer certain advantages, and can be more easily preserved from decay.

In the canvas we meet with the results of injuries or spontaneous decay. A rent may be mended by rags of linen stuck at the back of the picture. Even a hole may be filled up by pieces taken from other decayed paintings. If the picture is considerably damaged, it will be best to line it. But if the whole canvas is rotten and tattered, it will be preferable to sacrifice it by pulling off the threads one by one, after having secured the painting itself by pasting paper on the front of it. This done, the painting is transferred to another canvas in the same way as those removed from wood.

There are different modes of priming, which may be brought under two principal heads: the distemper and the oil priming.

1. The canvas is distempered by a mixture of chalk or plaster and paste, or glue, which may be laid on raw, unbleached canvas, or this latter may be beforehand prepared with glue or paste. Several coats of this mixture must be put on in succession, one being perfectly dry before the next can be applied. Many of the older oil paintings were painted on such ground. It has the advantage of being quicker prepared, of absorbing the excess of oil, of permitting the colour to enter into the priming, and to dry quicker, and, moreover, of containing a white absolutely innocuous to the other colours.

The inconveniencies, on the other hand, are: that it more easily cracks, and under the influence of humidity separates from the canvas.

2. The oil priming consists of several coats of oil colours. As each of these must be perfectly dry before the next is laid on, and as, moreover, time must be given to the whole to dry completely before painting upon, in order to avoid the sinking in of the colours, the whole preparation is much slower than the distemper. Nevertheless it is now generally adopted.

Rey, in France, has pointed out a process which is a compromise between the two methods: he begins by distempering, and after several coats of distemper, having dried one after the other, he puts a

coat of oil which, as it were, changes the distempered ground into an oil-colour ground.

With oil priming it is of importance that the principal colour be white-lead, to which are added comparatively small quantities of yellow, black, or other colours. For a whole century a school, that of Bologna, predominated in Italy, which abandoned this principle. During the second half of the 17th and the first half of the 18th century, most of the Italian masters of other schools followed its example. Probably for the purpose of obtaining more easily the desired effect of the *chiaroscuro* they painted on a brownish-red priming, which consisted of bolus mixed with umber. Not one of those pictures has kept its original colouring. Not only has the priming caused all the dark parts to grow much darker, but it has destroyed, or nearly so, all the glazing, so that only those colours can be recognised which either contain white, or are glazed on white. I can show you numerous instances of this, for, on account of the extreme fertility of this school, there is little difficulty in procuring pictures of masters of that time or of their pupils.

Wood priming does not require the same elasticity as that of the canvas, which ought to be capable of being rolled. Therefore the priming of the wood shows less variations. It is generally composed of chalk or plaster, tempered with starch, paste, size, or glue, and more or less thickly laid on. In some pictures of different centuries we find, either between the wood and the priming, or between the priming and the painting, canvas, and exceptionally even paper.

The diseases of the priming are not of a very complicated nature. They manifest themselves principally in three different ways: 1, by cracks in the priming itself; 2, by the severance of the priming from the painting; 3, by the severance of the priming from the wood or the canvas. The third disease is by far the most frequent, especially among pictures on canvas distempered with paste. If small pieces only are scaling off or blistering, they are fixed again to the ground by letting a solution of size pass between the detached part and the canvas, and pressing both gently together. If the deterioration extends over a considerable surface, the picture has to be lined. While this is being done, and while the gluing substance penetrates into the picture, the detached parts are pressed on again with slightly heated irons. If the whole priming threatens to come off, it will be better to take the picture entirely from the panel or canvas, and to transfer it to a new canvas.

I shall show you examples illustrating the before-mentioned points, and among them two pictures; one in oil, taken off from canvas, the other in *tempera*, taken off from wood. Both of them, strange to say, have escaped destruction without having been transferred to a new canvas, and without being covered with paper, as is usually done, before taking them off. They show you the painting by itself from both sides. I have, of course, used every precaution

in bringing them safely over from Florence, where I happened to discover them carelessly stowed away among heaps of old pictures.

We come now to the most important part of the picture, the painting itself. We meet very often with the idea that the old masters had been in possession of colours, that is pigments, the knowledge of which has been lost, and that this accounts principally for the difference between the oil painting of the 15th and 16th centuries on the one hand, and that of the 18th and 19th on the other. But this is a great mistake. We know perfectly well the pigments used by the old masters; we possess the same, and a considerable number of new ones, good as well as bad, in addition. In using the expression of good and bad, I am principally thinking of their durability. From this point of view the pigments can be placed under three headings:—

1. Those which are durable in themselves, and also agree well with the other pigments with which they have to be mixed.

2. Such as when sufficiently isolated remain unaltered; but when in contact with certain other pigments change colour, or alter the others, or produce a reciprocal modification.

3. Those which are so little durable that, even when isolated from other pigments, the mere contact of the vehicle, the air, or the light, makes them in time fade, darken, or disappear altogether.

The old masters used, without reserve, only those belonging to the first of these three categories. For those belonging to the second they imposed on themselves certain limits and precautions. Those belonging to the third they did not use at all.

That some of the modern masters have not followed these principles is not owing to a lost secret, but to the fact that they disregarded those well-known principles, and even consciously acted against them. In Sir Joshua Reynolds's diary, for instance, we read that, in order to produce certain tints of flesh, he mixed orpiment, carmine-lake, and blue-black together. Now, orpiment is one of the colours of the second category, carmine-lake one of the third. That is to say: orpiment, as long as it remains isolated, keeps its brilliant yellow or reddish-orange colour; but when mixed with white-lead it decomposes, because it consists of sulphur and arsenic, and it, moreover, blackens the white lead, because the sulphur combines with it. Carmine-lake, even if left isolated, does not stand as an oil colour, and therefore has been superseded by madder-lake.

Unfortunately, some of the most brilliant colours are perishable to such a degree that they ought never to be used; yet, it seems to me, that just in one branch of art in which of late remarkable progress has been made, I mean landscape painting, the artists, in order to obtain certain effects of colour not easily to be realised, do not always resist the temptation to make use of a number of pigments, the non-durability of which is proved beyond doubt. However that may be, I think it pretty certain that the pigments in themselves play only a subordinate part in the deterioration of oil paintings, and that the

principal part belongs to the vehicle with which the colours are ground, and to the liquids which are added during the painting. I hope, therefore, you will excuse my making some elementary explanations about these liquids.

Oil and fat are bodies consisting of carbon, hydrogen, and oxygen. They may be considered as salts in which glycerine, as a basis, is combined with different acids, stearic acid, palmitic acid, oleic acid. If oil is exposed to the air, it changes; certain kinds of oil remain liquid; others become thicker and darker, and are gradually transformed into hard and opaque bodies. The drying of oils is based upon a chemical process, during which the oil oxidizes by absorbing oxygen from the air, and combining a part of it with carbon to form carbonic acid, and another part with hydrogen to form water. The different oils dry with different rapidity, but this rapidity may be modified by the presence of certain substances, or by certain treatment. Linseed oil, for instance, according to the way in which it has been pressed out of the seed, contains more or less mucilaginous substances. These latter impede the drying of the oil, and have therefore to be removed by a refining process. If linseed oil in a shallow vessel is exposed to the air and light, and especially to a green light, it soon begins to dry, and is transformed, first, into a kind of varnish, and gradually into a solid opaque substance. The drying may be quickened by boiling, and more particularly by the addition of lead, zinc, or manganese. In this way a quick-drying oil varnish may be prepared and used as a siccativ. It follows that there are certain substances which impede the drying of oils, and others which facilitate it. Amongst the pigments are some which belong to this category of bodies, white-lead, zinc-white, minium, vermilion, for instance, facilitate the drying; others, such as ivory-black, bitumen, madder-lake, will impede it. Supposing now we should add to each of the different pigments the same quantity of oil, the drying of it would progress at different rates. But in reality this difference is very greatly increased by the fact that the different pigments require very different quantities of oil, in order to be ground to the consistency requisite for painting.

Pettenkofer quotes the following figures, given to him by one of the colour manufacturers:—

100 parts (weight)	White-lead	..	..	require	12 parts of oil.
”	”	Zinc-white	..	..	” 14 ”
”	”	Green chrome	..	..	” 15 ”
”	”	Chrome-yellow	..	..	” 19 ”
”	”	Vermilion	..	..	” 25 ”
”	”	Light red	..	..	” 31 ”
”	”	Madder-lake	..	..	” 62 ”
”	”	Yellow ochre	..	..	” 66 ”
”	”	Light ochre	..	..	” 75 ”
”	”	Camel's-brown	..	..	” 75 ”
”	”	Brown manganese	..	..	” 87 ”
”	”	Terre verte	..	..	” 100 ”

100 parts (weight)	Parisian blue	..	..	require	106 parts of oil.
”	”	Burnt terre verte	..	”	112 ”
”	”	Berlin-blue	..	”	112 ”
”	”	Ivory-black	..	”	112 ”
”	”	Cobalt	..	”	125 ”
”	”	Florentine-brown	..	”	150 ”
”	”	Burnt terra sienna	..	”	181 ”
”	”	Raw terra sienna	..	”	240 ”

According to this table a hundred parts of the quick-drying white-lead are ground with twelve parts of oil, a hundred parts of the slow-drying ivory-black require one hundred and twelve parts of oil.

It is very important that artists should have an exact knowledge of these matters. But it seems to me that they are insufficiently known to most of them. All, of course, know perfectly how different the drying quality of different colours is. But that these different colours introduce into the picture so different a quantity of oil, and how large this quantity is in the colours they buy, and further, that the oil as well as the mediums or siccatives they add to dry the colours, are gradually transformed into a caoutchouc-like opaque substance, which envelops and darkens the pigments; and moreover, that the oil undergoes—not in the beginning, but much later on when it is already completely dry—changes of volume, and so impairs the continuity of the picture,—all this is not sufficiently known. Otherwise, the custom of painting with the ordinary oil colours to be bought at any colourman’s, would not have been going on for nearly a hundred years in spite of all the clearly shown evil results; results due, chiefly, TO THE PRINCIPAL ENEMY OF OIL PAINTING, THAT IS TO SAY, THE OIL.

That the masters of the 15th and 16th centuries did not use colours prepared in this way, you may consider as absolutely certain; and if we hear the lost secret spoken of, and if we read that the pupils of the old masters had to pledge themselves to keep the secret, we may be sure that it is neither the method of painting nor the pigment used for it which is concerned in that secret, but exclusively the way of preparing the colours. The preparation was a very complicated one, varying with the different pigments; and we know that the pupils passed six years, that is half of the apprenticeship, in grinding the colours for the master.

And therefore it is to this very point that everyone who wishes to study the method of the old masters must first of all direct his attention. I, too, was led by the study of this question, to analyse and restore old pictures. The possibility of making such analysis we owe to the relation between the old masters and their pupils. Of course we could not dissect or chemically analyse works of Titian or Raphael. But fortunately the pupils painted with the same material and by the same method as the masters, and thousands of pictures by the pupils, *well preserved* or in different stages of decay, may be easily procured.

I have myself, from among a very great number of such pictures, selected about one hundred specimens, part of which I have brought before you. As their artistic value is not, as you perceive, of the highest description, we need not feel any scruple in experimenting upon or even destroying them, if we can thereby gain any valuable information.

If we compare the pictures of the Italian and Dutch schools of the 15th, 16th, and 17th centuries, with those of the French and English schools of the last hundred years, we are struck by the great difference in the nature of their diseases. We may divide those diseases into *constitutional* ones—that is to say, such as are based on the method and the material used for painting, and into those produced by external influences.

The Dutch pictures of the 15th, 16th, and 17th centuries, and the Italian pictures of the 15th and 16th centuries, seem to me perfectly free from constitutional diseases. It is only in the 17th century that the Italian pictures show a special constitutional alteration, caused by the practice of the Bologna school.

The pictures of the last hundred years of the French school, of a part of the English school, and some painters of other schools, have been attacked by a constitutional disease perfectly defined and characteristic of this period.

Among external influences injurious to oil painting, we have to consider dampness, heat, bad air, dust, smoke, mechanical injuries, and last, not least, the destructive, or “altering” hand of the picture-restorer.

Pettenkofer's scientific researches first clearly defined the influence of humidity on oil paintings, showing that it produced a discontinuity of the molecules of the vehicle and the resinous substances. As glass, when pulverized and thereby mixed with air, loses its transparency, and water, when mixed with oil, becomes of a milky aspect, so the oily and resinous substances contained in paintings will become dim as soon as air penetrates between their particles. The picture thus assumes a greyish, dim appearance, and the pigments seem to have been fading. That this is not really the case has been proved by the influence of a process invented by Pettenkofer, which he calls regeneration. In a flat box the picture is exposed to air impregnated with alcohol. Of this latter, the resinous elements of the picture absorb a certain quantity, swell and fill up the interstices between the separate particles so as to reunite them into an optically homogeneous, transparent substance.

The alcohol does not affect in the same way the hardened oil. If the interstices between its particles are not filled up by the swelling resin, it becomes necessary to introduce a new substance into the picture, and this is called nourishing a picture.

Pettenkofer has the great merit of having clearly proved that the nourishing of a picture with oils, as the custom was formerly, and still is to some degree, is a very objectionable proceeding, as it has

the effect of darkening the colours for ever. He recommends, instead of oil, balsam of copaiva, which has become since an invaluable means for preserving and restoring oil paintings, and will be more and more extensively used.

I have frequently applied Pettenkofer's method, and with very beneficial effect; but whenever I mentioned it to professional picture-restorers, here as well as on the Continent, I always found them to reject it, either *à priori*, or after experiments incorrectly made.

In Munich, it seems, the pictures of all periods and of all schools have had to suffer under local influences and through the changes in the humidity of the air. This accounts for Pettenkofer having principally described this, so to say, endemical disease. In other galleries this affection does not appear so frequently, and Pettenkofer's method, therefore, will not find everywhere the same extensive application as at Munich. I think, however, that with some modifications it may be employed against some other alterations. I have, for instance, found it efficacious with paintings which had been injured by exposure to great heat. I shall show you a small picture which had been hanging for a long time so near a gas flame that it was almost completely scaling off, and so entirely faded that it scarcely looked like an oil painting at all. In that state it was exposed to alcoholized air, then nourished with balsam, and its back slightly varnished: and the scales starting from the canvas were refixed by pressure. And now it appears fresh in colour, firm in substance, and perfectly smooth on its surface. The old, cracked varnish, melted together by the alcohol, looks as if fresh laid on.

Humidity sometimes favours the development of fungus. The round, black, small spots which pass through the canvas and the painting of these two pictures are produced by the same little plant which Professor Tyndall showed you when he spoke on the highly interesting subject of spontaneous generation.

Oil and water, so injurious to oil paintings, enter both into the material used for lining. Anxious to exclude these sources of danger, and to simplify the whole process, I have endeavoured to replace it by a new method which I shall submit to you this evening.

How paintings may be disfigured by restorers you see in this picture, which was renovated with oil colours according to the practice only abandoned about thirty years ago, when it was advantageously replaced by the use of varnish colours.

The amount of external injury oil paintings sometimes endure and stand is perfectly amazing. Pictures in the course of centuries, during the destructive fury of wars and revolutions, may have been torn out of their frames, rescued from below the ruins of burned monasteries, may subsequently have passed from one bric-à-brac shop to another, where they have been piled up, to be pulled about at each new inspection, and literally trodden under foot, whereby they have finally been reduced to a state of colourless, greyish, or black rags. Still such pictures may not unfrequently be awakened, as it were, to

new life, to their original brilliancy of colour; if, with all necessary care, their injured limbs are put together again, their wounds are healed, and fresh nourishment, air, and thorough cleansing, are administered to their lacerated bodies.

A sound constitution is, of course, a necessary condition for obtaining any such result, without it we can only obtain a partial cure. We see this with reference to the Bologna school of the 17th century. The pictures which you see here are instances of this. From the state of rags to which they were reduced they have passed, by appropriate treatment, into the state of firm, even, well-conditioned, and clean pictures. The constitutional alteration characteristic of their time and school, however, could not be cured. You will, therefore, perceive that the contrast is too great between light and shade, that the half tones are too weak and that the glazings spread on dark ground, which certainly existed formerly, have been destroyed by the growing of bolus and umber of the priming. That this is not the fault of the method of restoration is clearly proved by the state in which you will find all the pictures of this school, even those best preserved in the best galleries of all countries.

The constitutional diseases of pictures belonging to the French and to the English school of the last hundred years are of still more serious nature, and much more difficult to cure. Many of them, though they were never exposed to any injury whatever, nor are likely ever to be so in our present state of civilization, cannot be guarded from premature decay in spite of all possible care with which they are kept.

The principal symptoms of their bad constitution are:—

1. Darkening of the opaque bright colours.
2. Fading of the transparent brilliant colours.
3. Darkening, and above all, cracking of the transparent dark colours.

The best opportunity to study these several appearances is given us in the Museum of the Louvre, which contains a great number of such pictures in the section occupied by the French school. I have paid particular attention to the cracks in these pictures, as I find that in shape, in size, in position, as well as in relation to the various colours, they differ distinctly from the cracks in older pictures, and in those of other schools. This, of course, is of importance, not only for the explanation of the reasons which produced them, but as a symptom which, in a given case, might determine the diagnosis, whether a picture be an original or only a copy. The special characteristics of these cracks are the following:—

They are all but exclusively found in the thickly laid on transparent dark colours, and they are the deeper and the more gaping in proportion to the thickness of the layer of the colour and the extent of the dark surface. The chief cracks run parallel to the outlines of surfaces painted with bright opaque colours, such, for instance, as are used for the flesh tints, and which are more or less thickly laid on.

But there is generally a slight distance between the bright colours and the cracks.

Lateral branches of these cracks pass into the white, but they do not gape, provided the white colours had been laid on directly upon the priming, and not upon a layer of dark transparent and not sufficiently dried colour.

This examination of the cracks of pictures has sometimes afforded me a peculiar insight into the practice used for the picture. In the well-known picture, for instance, by Guéricault, of "The Wreck of the Medusa," in the Gallery of the Louvre, the cracks follow exactly the outlines of the bright flesh-tints. The arm of one of the dead bodies hanging in the water is so covered by planks and water that nothing of the forearm is to be seen. It is, however, very easy to prove that originally that arm was painted in all its length, for the cracks do not only follow the outline of the visible upper arm, but also the no longer visible forearm, and all the five fingers. This proves that the fore-part of the arm and the hand were originally painted in flesh tints before they were covered over by the planks, and the water painted afterwards. In Ingres' portrait of Cherubini, the face of the latter is beautifully preserved, whilst that of the Muse, as well as her drapery, is covered with cracks. In the depth of the cracks of the white drapery, an intense blue tint is to be seen. Mr. Henri Lehmann, of Paris, the favourite pupil of Ingres, who knows the history of this picture as an eye-witness, and whom I consulted about this very striking appearance, gave me the following information:—Ingres painted the head of Cherubini in Paris, and then took it with him to Rome. There it was pieced into a new canvas and lined. Then the Muse was painted, and before the colours were perfectly dry, another model was chosen, and a new Muse painted over the old one. The colour of the drapery was likewise altered, and this explains the cracks in the white colour, and explains also why the blue appears in the depth of the cracks of the drapery.

Among the English artists of the last hundred years, some have painted with the same material and by the same process as their French contemporaries, and consequently with the same unfortunate results. Others avoided these by using the same material with more precautions. Others again, and among them Sir Joshua Reynolds, have, in their different works, followed various practices, and consequently had varied results. Thus, some of Sir Joshua's pictures have kept perfectly sound. Others are cracked in the characteristic way just mentioned. Others, again, are cracked in an absolutely irregular way. We can easily form an idea of it, if we read in his 'Diary Notes,' for instance, the way in which he painted the portrait of Miss Kirkman, which he began with whiting and gum tragacanth, then covered it successively with wax, then white of eggs, and then varnished it.

The study of the alterations already fully developed in pictures painted within the last hundred years only, and their comparison with

the works of the old masters, would suggest the following rules for the process of painting:—

1. The oil should in all colours be reduced to a minimum, and under no form should more of it than absolutely necessary be introduced into a picture.

2. All transparent colours which dry very slowly, should be ground not with oil at all, but with a resinous vehicle.

3. No colour should be put on any part of a picture which is not yet perfectly dry; and, above all, never a quick-drying colour upon a slowly drying one, which is not yet perfectly dry.

4. White and other quick-drying opaque colours may be put on thickly. On the contrary, transparent and slowly drying colours should always be put on in thin layers.

If the effect of a thick layer of these latter is required, it must be produced by laying one thin layer over another, taking care to have one completely dry before the next is laid on. If transparent colours are mixed with sufficient quantity of white-lead, they may be treated like opaque ones.

We come now to the last layer of the picture, to that one which is spread over its surface in order to equalize optical irregularities, and to protect it at the same time from the air. I mean the varnish.

The varnish may crack or get dim, then it should be treated by Pettenkofer's method; but it may become dark yellow, brown and dirty, and so hide the picture that it becomes necessary to take it off and to replace it by a thin layer of new varnish. It is here that picture restorers, or we may say picture cleaners, display their beneficial skill, and also their very destructive activity.

If a picture is throughout painted in oil, if its substance has remained sound and even, and varnished with an easily soluble mastich or dammar varnish, then there will be neither difficulty nor danger in removing the varnish. This can, in such a case, be done either by a dry process, that is, by rubbing the surface with the tips of the fingers, and thus reducing the varnish by degrees to a fine dust, or by dissolving the varnish by application of liquids, which, when brought only for a short time into contact with the oil painting, will not endanger it. We have, however, seen that the works of the old masters are not painted with oil colours like those used by modern painters, but, on the contrary, that certain pigments, and especially the transparent colours used for glazing, were ground only with resinous substances. These latter have, in the course of time, been so thoroughly united with the layer of varnish spread over the surface of the picture, that there no longer exists any decided limit between the picture and the varnish. It is in such pictures that a great amount of experience, and knowledge of the process used for the picture, as well as precaution, are required in order to take away from the varnish as much only as is indispensable, and without interfering with the picture itself. Numberless works of art have been irreparably injured by restorers, who, in their eagerness to

remove dirt and varnish, attacked the painting itself. They then destroyed just that last finishing touch of the painting without which it is no longer a masterpiece.

The difficulty and danger are much greater in cleaning those pictures which have not been varnished with the ordinary easily-dissolved mastich or dammar varnish, but have been painted over with oil, oil-varnish, or oleo-resinous varnish. It seems incredible that these substances should ever be used for such purposes; it is, however, a fact that there are still people who fancy that it will contribute to the good preservation of their pictures to brush from time to time a little of those liquids over their surface. They recognise too late that the varnish becomes more and more dark, of a brownish colour, and opaque. If such varnish has afterwards to be removed, then we meet with the great difficulty, that this can be done only with substances which would just as easily dissolve the whole picture as the hardened layers spread over it.

This shows what can be the value of those universal remedies which from time to time appear, and are praised for the innocuous way in which pictures by their means may be cleaned.

There is at this moment a great discussion going on in Italy about Luporini's method. Luporini is a painter and picture-restorer in Pisa, who believes himself to have invented a new means of cleaning pictures without any danger. Some months ago, in Florence, I examined a large number of pictures cleaned by him. Those of the Gallery of St. Donato, belonging to Prince Demidoff, mostly Flemish and Dutch landscapes, are cleaned very well and without any injury to the painting. On the contrary, the St. John, by Andrea del Sarto, one of the finest pictures of the Palazzo Pitti, I found very much altered by the restoration of Luporini. I had studied that picture very closely the year before, and should now sooner believe it to be a modern copy than the cleaned original. It has lost all softness of outline, and the characteristic expression of the face. The change in the flesh tints can scarcely be explained otherwise but by an entire removal of the glazing.

I think it is taking a heavy responsibility to allow a new experiment to be tried upon such an invaluable work of art. Even private persons who are fortunate enough to be in possession of such treasures ought to feel responsible for the good preservation of masterpieces, which are, it is true, their material property, but which intellectually belong to the whole civilised world of the present and of the future.



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